In naming these latter creatures specifically, I have done so with considerable hesitation, as it must be confessed my knowledge of these groups is much too limited to warrant my speaking with any great degree of certainty.

Thus ends my notes on *Lumpenus lampetriformis*; and I trust its habits and history have not been left shrouded altogether in the darkness in which I found them.

Since writing the foregoing I got, on June 5th, five more specimens of *Lumpenus*, one of them, a female, carrying spawn, which would have been deposited within a fortnight or three weeks at latest. This brings my supposition relative to the time of spawning to be pretty nearly correct, viz. the end of July or beginning of August.

The longest specimen mentioned by Collett was 412 millim.; my longest one was $12\frac{1}{2}$ inches.

On the Anatomy of the Perignathic Girdle and of other Parts of the Test of *Discoidea cylindrica*, Lamarck, sp.

By Prof. P. Martin Duncan, F.R.S., and W. Percy Sladen, F.G.S., Sec. L.S.

[Read 17th June, 1886.]

Discoidea cylindrica, the *Galerites cylindricus* of Lamarck, is one of the commonest of the Echinoidea from the Upper Cretaceous strata; and its shape and internal casts in flint are familiar to all geologists. Desor, Wright, and Cotteau have described the species; and the last-named palæontologist has enlarged the generic diagnosis of *Discoidea* in consequence of some morphological details which had been elaborated by himself and some previous observers, especially E. Forbes and Lovén.

Discoidea cylindrica has five basal plates in its apical system, and the fifth or the posterior one is not perforated for a genital duct. But the palæontologists just mentioned found a perforated fifth basal in species which they felt bound to classify in the genus *Discoidea*. Lovén, speculating on this association of imperforate and perforate basals in different species of the same genus, considered it an instance of evolution during time. Cotteau extended the generic diagnosis, and added to that of Desor the following:—"Apical system compact, subpentagonal,

presenting in some species five genital plates which are perforated, and in some other species a complementary imperforate plate in the position of the odd generative plate" (Éch. du Dépt. de la Sarthe, 1869, Supp. p. 412). Desor had restricted his diagnosis to the structures with which he was acquainted; but his specimens do not appear to have been good ones, for he stated that the apical system is small and rarely distinct in its details; but he noticed that the odd genital plate is not perforated by the duct, and that the ocular plates are very small ('Synopsis,' p. 175).

The late Dr. Wright is at issue with all the other describers of the species about the extent of the madreporite; and his descriptions of the ambulacra and interradia of *Discoidea cylindrica*, upon which he placed a specific value, are doubtful. There are therefore many reasons why this familiar form should be studied, and especially as in one of the many beautiful specimens in the British Museum the perignathic girdle is exposed and can be understood. We propose, therefore, offering the results of our study of the most important details of the test in this and some other species of the genus, and we trust that some of the differences of opinion have now been settled, and that some fresh anatomical details have been utilized.

Apical System.—The specimens examined in reference to this and all the other anatomical structures are in the British Museum, the Museum of Practical Geology, Jermyn Street, and one is in our possession. The full-grown specimens show how small the apical system is in relation to the dimensions of the test, that there are five basals, none being complementary, and that whilst four of them (Nos. 1 to 4) are perforated by genital ducts, all of the five are penetrated by the madreporite. There are faint or decided grooves between the basals. In the largest specimens the distribution of the madreporite is well shown; and in No. 4663, Brit. Mus., the fifth basal is large and pentagonal, and is marked only by a few of the pores of the madreporite; and in a smaller specimen which is half-grown, belonging to us, the pores are absent in the fifth basal.

Dr. Wright (Monogr. Cret. Echin., Pal. Soc. Lond. 1874, vol. i. pt. vi. p. 207, pl. xlvi.) refers to the apical system. The type he examined has a perfect apical system, and each of the basals is perforated by the madreporite, and four basals are perforated by the genital ducts. But the author, by an unfortunate oversight, states that the madreporite is only seen in the right anterior

basal. This is erroneous, and so is the figure given in his plate. The same specimen shows the very small size, comparatively, of the radial plates (oculars).

It is evident then that the adult forms of *Discoidea cylindrica* have all the five basals perforated for the madreporite, and all, except the fifth, perforated for the genital duct.

The Ambulacra.—Wright was the first to point out that the simple, straight condition of the pairs of pores was not universally found in the species, but that the pairs on the actinal area might fall into a biserial arrangement.

Now it appears to us that allowance must be made for the age and size of the tests in considering the particular distribution of the pairs of pores; for in the largest specimens the arrangement of the pairs differs from that seen in the immature forms, especially near the peristome. Again, there is a point which must be remembered, and it is that in full-grown specimens the ambulacra are flush with the test above the ambitus and raised above its level actinally. The poriferous zones are on the slant of the raised surface actinally; and it is on this slope that the greatest crowding of the pairs of pores happens. Above the ambitus the simple arrangement of the pairs in one row is invariable; and it is seen in small forms even near to the peristome. As a rule, the pairs are not crowded above the ambitus; and they may be larger there than actinally, where the crowding may be considerable.

The height of the ambulacral plates differs according to position and age. They are high near the peristome in young forms, and low close to the ambitus; and they are less unequal in adults. The horizontal sutures between the plates are often slightly furrowed.

The plates may be primaries, or compound with two or three constituents. The plates near the apical system and extending towards the ambitus are primaries. Taking the specimens in the British Museum, Nos. 38742, 723, and E 180, and also the half-grown specimen in our possession as examples, it is to be observed that near the radial plates there are low, broad primary plates, each having a pair of pores placed close to the interradial suture*. The pores are large and separated by a ridge; and

* The late Dr. Wright (*op. cit.* p. 207) seemed to separate the poriferous zones from the ambulacral plates; for he wrote, "The poriferous zones are

they are very obliquely placed in reference to the transverse sutures of the ambulacral plates. The outer pore is aboral, and is very close to the edge of its plate and the interradium; and the inner pore is adoral, and either close above the line of suture or on it; and in the first instance a narrow linear prolongation of the pore may occasionally be seen passing down to the suture between the plate and the next in adoral succession (figs. 1 and 1 *a*). (B.M. 38742.)

Fig. 1.

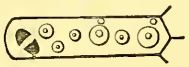


Fig. 1 *a*.

The number of these primaries is considerable; and they almost reach the ambitus in specimens which are not adult. They are followed by, or alternate with, compound plates composed of a primary and a low, short demi-plate (fig. 2), or a demi-plate may be intercalated between two primaries, the three not forming a compound plate (fig. 2 *a*). (B.M. 723.) The demi-plate in this instance was a primary which has been crowded-out by the growth-pressure of the primary above and below; but in the other instance (fig. 2) the demi-plate has been so pressed upon that it has been fused, as it were, with the primary.

Fig. 2.

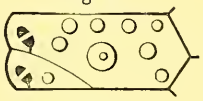
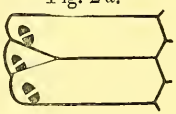
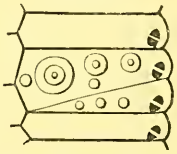


Fig. 2 *a*.



Both in the specimen marked 723 in the British Museum and in one in our possession the primaries are followed, at the ambitus or just above it, by taller compound plates, each of which consists of a large primary placed abactinally, and a low, broad, triangular demi-plate situated actinally. The two plates are united by very delicate sutures and form a geometrical compound plate (fig. 3). (See also B.M. 180.)

Fig. 3.



Sometimes, at the ambitus, there is a third plate in a compound plate; and the arrangement seen is very unusual in the Echinidæ. For:—(1) The pairs of pores are very slightly out of the straight vertical line. (2) The upper plate is a large primary which occupies the whole of

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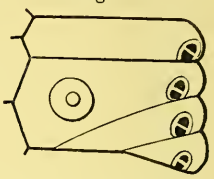
very narrow, and have one pair of small round holes opposite each ambulacral plate." The pores are of course in ambulacral plates. On the same page it is stated, "near the mouth-opening two rows [of pairs of pores] go to each plate." This is incorrect; for there is but one pair to a plate.

the compound plate at the median suture of the ambulacrum (fig. 4). (B.M. 180.) (3) There are two demi-plates; the upper one has its aboral suture passing actinally so as to reach the adoral suture of the compound plate at a little distance from the median suture; whilst the lower demi-plate has its aboral suture also sloping actinally and reaching the common adoral suture not far from the interradial edge.

Fig. 4.

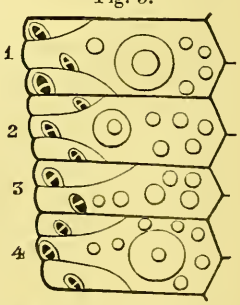


The position of these demi-plates is exactly opposite to that noticed in the compound plates of the Triplechinidæ*.

In nearly all the specimens the size of the pores diminishes actinally, but this is not invariable; and in all cases the pairs become closer, and alternate pairs are crowded out of the straight vertical line. There is no intercalation of pairs—that is, no new growths amongst the original pairs. Actinally, and on the slope of the raised ambulacra, which have already been noticed, the pairs of pores are crowded and biserial in their arrangement, and the pores are placed so obliquely that the aboral one is nearly vertical to the adoral. Although the crowding of the pairs is often excessive, still there is never more than a pair to a plate; and the plate, often very small, forms part of a compound plate. Solitary primary or demi-plates which do not enter into the composition of compound plates are not found below the ambitus. The compound plates there consist of a primary with one or two demi-plates.

The following is a description of four compound plates placed near the ambitus and actinally (fig. 5). (B.M. 38742.) Plate 1, the abactinal one of the series, consists of a large middle primary and a small aboral demi-plate and a larger adoral demi-plate. The aboral demi-plate is perforated by a pair of the outer set of pores of the biserial zone, and the primary by a pair of the inner set, whilst the adoral demi exhibits a pair of pores similar to those of the aboral demi-plate. But the primary occupies the whole of the median suture, and the demi-plates do not come in contact; for the adoral suture of the

Fig. 5.



* Lovén, 'Etudes,' pl. xvii.

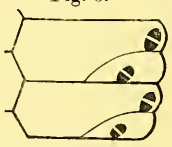
upper one curves aborally to reach the aboral suture of the compound plate, and the adoral demi-plate has its aboral suture curved so as to reach the adoral suture of the compound plate.

The next compound plate (2) is formed in the same manner as that just described; but the demi-plates are smaller, and are perforated by pairs of pores which belong to the inner set; on the other hand, the primary placed between the demi-plates has a pair of pores of the outer set, and this is the reverse of what occurs in the plate above. Plate 3 has only two components, and the abactinal plate is a low broad demi-plate perforated by a pair of pores of the outer set; the actinal plate is a low primary, and its pair of pores belongs to the inner set.

Plate 4 is formed like plate 2, but the demi-plates are larger; moreover, the pairs of pores of the upper demi-plate are of the inner set, like the pair seen in the demi-plate placed immediately abactinally in the compound plate above; but they are placed nearer the interradium than the pair above, and the result is to give a triple series of pairs of pores with the pair of the primary of plate 4. This triple appearance is rare in *Discoidea*. It will be observed that the composition of the four compound plates, omitting the biserial condition, is suggestive of that seen in the genus *Cœlopleurus**.

At some little distance from the peristome the alternation of outer and inner pairs of pores continues, and the compound plates are rarely formed of more than two plates. The primary of the compound plate is low and broad, and is placed abactinally, whilst the very small demi-plate is found at the actinal and outer part of the plate. When a tubercle is present, the primary becomes high. The primary has a pair of the outer series of pores, and the demi-plate a pair of inner series (fig. 6).

Fig. 6.



In half-grown specimens a decided change occurs in the pairs of pores at a little distance from the peristome, and they become larger, wider apart, and the arrangement is nearly in simple series (fig. 7). The pores of each pair are very oblique and almost vertical; and the greater number belong to primaries which are higher than those nearer the ambitus. A few are in demi-plates. In older specimens the simple series close to the peristome is much shorter, and indeed barely

Fig. 7.

* Duncan and Sladen, Journ. Linn. Soc., Zool. vol. xix. 1885, pl. i.

exists, the pairs not being so large comparatively as in the younger forms, and with their arrangement biserial.

In both instances the expansion of a tubercle-bearing plate increases its height; and it is followed by small low primaries or by a demi-plate. The adult specimens conform very much to the drawing given by Lovén of the peristome of *Discoidea conica* ('Études,' pl. xiv. fig. 125).

The peristomial end of the poriferous zones is contracted, and a series of tubercles separates the pairs from the position of the interradial suture; so that there were spines in rows up the narrow space of the peristomial funnel-shaped tube. The first pairs of pores are not visible from without, for they are high up in the peristomial tube, and are placed in the processes of a structure which is termed the perignathic girdle (Journ. Linn. Soc., Zool. vol. xix. p. 179.)

In a specimen attributed to *Discoidea cylindrica* in the British Museum (No. E 180), which is half-grown, and has not become cylindrical in outline above the ambitus, but is simply hemispherical, the arrangement of the plates above the ambitus is somewhat exceptional. The pores are large and oblique, being in simple series and rather distant. The first four plates of a certain set are low and broad; then comes a tubercle-bearing primary with a considerable downward expansion towards the median line. It is followed by a low primary which is almost a demi-plate on account of the diminution of its vertical measurement near the median line. This loss of size has been due to the growth of the primary above, and the pressure has made both plates to combine within a geometrical outline to form a compound plate. The next plate is a decidedly very low primary, and it is succeeded by a primary with a downward expansion forming a compound plate with a low primary, which is almost a demi-plate. This compound plate is followed by a low primary. Just above the margin in this specimen, the growth-pressure has altered the shape of the plates in a very instructive manner. There is a triplet, and the first plate of it is a large downwardly expanded primary; the next is a low and broad demi-plate, for the pressure has blocked out part of a low primary near the median line, and a demi has resulted. The third plate is a small narrow and low demi-plate; and this was once a very low primary resembling those further up. Pressure made it assume the shape of a common small demi,

and then the three plates were joined into a triple compound one. It appears that in some specimens the outer set of pairs of pores on the flank of the raised ambulacra are larger than the inner series; and when this is the case, the alternations of the pairs are very well seen.

The width of the ambulacra, compared with that of the interradia, is from one fourth to one third; and above the ambitus there are nine pairs of pores opposed to two interradial plates*.

The Interradial Plates.—These gradually diminish in size towards the peristome, and still more so as they pass up the funnel of the peristome to the perignathic girdle. At the girdle the odd interradium (No. 5) has a single plate; and although we are not quite satisfied on the point, it appears that there are single plates at the peristomial margin of the interradia Nos. 1 and 3. Double plates are seen at the margin of the peristome in interradia Nos. 2 and 4.

This is the arrangement of plates noticed in the funnel-shaped peristomes of *Echinoneus* and *Amblypygus* †. Lovén has figured a solitary plate in the peristome of *Discoidea conica* in interradium 5 ‡.

The Peristome.—The actinal aperture is very small in relation to the dimensions of the test; it leads up through a sort of funnel-shaped tube to the peristomial margin, which is therefore well within the test, and not flush with its actinal surface. The peristomial tube becomes narrower upwards, and its upper margin merges into a remarkable perignathic girdle. The opening of the peristome actinally is very nearly circular, and in no instance is it worthy of the term decagonal; there is the slightest departure only from a continuous curvature. But when the upper margin of the peristome is seen from below, the outline departs more from that of a circle, and ten slight curves are seen—five, broad and decided, are interradial, and five, narrower and less formed, are ambulacral. There are no notches actinally; but at the margin of the peristome and at the edge of the perignathic girdle there are faint groove-like notches between the interradia and the ambulacra.

* In describing the ambulacra, the late Dr. Wright stated that about three of its plates correspond vertically to one interambulacral plate (*op. cit.* p. 206); but in the plate drawn by Bone, pl. xlvi. fig. 1 *d*, nine pairs of pores correspond to two intcrambulacral plates; and that is correct.

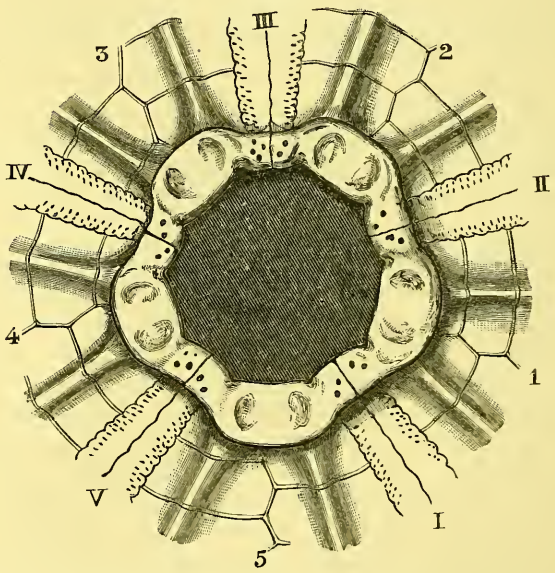
† Duncan and Sladen, Pal. Ind., ser. xiv., Tert. Echin. of Kachh, p. 17.

‡ Lovén, 'Études,' pl. xiv. fig. 125.

The curved edges of the inner extremity of the peristomial tube, as seen from below upwards, are not the terminations of the ambulacra and interradia; for when a section is made transversely through a test at the ambitus, and the chalk is cleared out from the actinal portion of the divided mass, plates are seen forming an internal oblique projection in the position of the perignathic girdle.

The projection is continuous around and above the peristomial tube, and is a perignathic girdle of a very remarkable and unique kind. The girdle is well seen in a specimen at the British Museum No. 40341 (fig. 8); and it will be observed that the so-called

Fig. 8.



ribs, ten in number, which pass over the inner surface of the actinal interradial plates, commence at the outer edge of the interradial parts of the girdle. The girdle is rather low, and surrounds the peristomial opening in the form of a raised, oblique, broad, ridge-like ring. The upper surface of the girdle is free, and consists of flat or slightly irregular slanting surfaces, the slant being towards the peristome, ending all round and outwards in a continuous and wavy free edge. This edge has the parts which correspond with the ambulacra thin, less projecting than the other portions, and re-enteringly curved. The parts

of the edge of the girdle which correspond with the interradia are boldly curved outwards and are larger than the others.

The outer wavy free edge of the whole girdle overhangs the inner surface of the base of the test, and the ribs just mentioned arise from the underpart of the overhanging structure. The upper surface of the girdle is of course between the edge just alluded to and the peristome; and its slanting surface is not a simple plane one, for on each of the broader interradial portions there is a slight depression on either side of the centre and an elevation close to the ambulacral curves. This depression is probably the relic of a muscular origin, one on each side of the median line of a plate. No sutures occur in the interradial parts of the girdle; but it is not satisfactorily shown that there are not sutures between the ambulacral and interradial portions along the line of the slight groovings which are on either side of an ambulacrum high up in the peristome, and at the lower edge of the inner surface of the girdle—that is to say, in the usual position of sutures in relation with branchial grooves or cuts*. There is a distinct median and more or less vertical suture in every ambulacral part of the girdle, and there are pairs of pores on the sides of it (fig. 8).

In ambulacrum III., zone "*b*," there are two pairs of pores which are placed obliquely, as is the case with the single pairs of the other ambulacra, and the pairs of the other ambulacra are at different distances from the free edge of the ambulacral parts of the girdle; and these different positions are exactly those which occur in the particular plates around the peristomes of other regular Echinoidea according to Lovén. The lower part of the girdle is continuous with the ambulacral and interradial plates of the actinal part of the test around the peristome. The inner part of the girdle is the upper continuation of the peristomial tube.

The anatomy of the perignathic girdle in the Echinoidea was described by one of us in this Journal (Journ. Linn. Soc., Zool. vol. xix. p. 179, 1885); and that of *Discoidea cylindrica* was noticed as follows (p. 182):—"In *Discoidea* there is a continuous girdle without arches, although the homologues of the processes exist." Reference must be made to the above-mentioned communication in order to comprehend the terminology. It is evident that there are no arched parts in *Discoidea cylindrica*; but it is

* Duncan, Journ. Linn. Soc., Zool. 1885, pl. xxx. fig. 9, letter *s*.

true that the ambulacral parts of the girdle are perforated by one or more pairs of tentacular pores; and therefore the parts thus penetrated are the homologues of the processes which in other Gnathostomes (omitting the Cidaridæ) form the sides to or processes of the arches ("auricles" of authors).

The interradial portions of the girdle in *Discoidea cylindrica* are the homologues of the ridges of the other regular Echinoidea, including the Cidaridæ, and, as in the other forms, the ridges are composed of one or more interradial plates.

On comparing the girdles of *Cidaris* and *Discoidea*, it will be noticed that both have the ridges well developed, and clearly in consequence of the attachment of protractor muscles. In Cidaridæ the utility of the retractor muscles is diminished by the nature of the scaly structure around the peristomial opening; and in *Discoidea* the extremely high and narrow peristomial tube and the spines attached to tubercles within indicate that wide opening of the jaw-ends could not occur even as much as in *Cidaris*.

Neither in *Cidaris* nor in *Discoidea* are the "processes" of the ambulacral parts of the girdle developed so as to afford origin or attachment to muscles; and it is evident that the portions of the ambulacra in *Discoidea* which are perforated, and which are the homologues of the processes of the ambulacral arches of the Echinidæ, could not have given attachment to muscles because of the presence of the pores; moreover, the processes of Echinidæ are not the origins of muscles, but the arches are. The distinction in structure between the girdles of *Discoidea* and of the Echinidæ, such as the species of the genera *Echinus*, *Salmacis*, *Temnopleurus*, *Diadema*, *Cœlopleurus*, *Strongylocentrotus*, &c., is evident; for there are no arches and no upward prolongations or processes to form arches in *Discoidea*. The greatest affinity in structure is with the Cidaridæ; but the difference is important, inasmuch as the ambulacral parts of the girdle are wanting in Cidarids, and are high and block the ambulacral path in *Discoidea*.

No trace of pyramids or of any portions of a dental apparatus has ever been found in *Discoidea*; but it is impossible to reject the supposition that the genus was gnathostomous, for the presence of ridges marked with depressions in the girdle would seem to point to muscular attachments and to the inevitable presence of jaws. The position of the jaws was probably not so vertical as in the Cidaridæ, but slanting more or less; and it is probable

that the teeth did not project, but moved as in the Clypeastroids. It is possible that the dental apparatus was slender, as it is in *Holectypus*.

The "Internal Ribs."—These ten ridge-like projections on the interradia within the test are low and narrow, but wider at their bases than at the free edge. They reach from the outer and under part of the perignathic girdle to the inner surface of the test just above the ambitus, and their height is about a millimetre near the girdle, and 3 millimetres at the opposite extremity.

There are two ribs to an interradial area, one on each side of the median line of suture of the interradium; and each one is placed along the middle of each row of interradial plates.

The ribs are not additional plates, but simply special upward growths of the middle portions of the upper surfaces of the interradial plates of the actinal part of the test. The sutures which are between consecutive interradial plates can be traced over the ribs. Finally, it must be noticed with regard to the growths of the inside of the test, that there is a low ridge along each median suture of the five ambulacra on the inside of the base of the test; it commences at the ambulacral part of the girdle, and gradually diminishes towards the ambitus of the test within *.

The Periproct.—This is small in relation to the size of the test, and is in a very slight concavity in the odd interradium, being nearer to the margin of the test than to the peristome. It is elongated in the direction of the antero-posterior axis of the test, and varies in shape from the elliptical with rather narrow ends to the ovoid with a considerable curvature posteriorly. It is bounded by four plates in one and five plates in the opposite zone; and the sixth plate from the peristomial margin, not including the first single plate, forms the inner boundary in one zone, and the seventh plate in the other zone.

The surface of the test, as has been remarked by nearly every observer, is remarkably punctate; and the multitudes of minute depressions have a corresponding number of small, close, sharp granules between them. The larger tubercles are in sunken scrobicules which are shallow; and there is decided crenulation and perforation.

* Zittel, Handb. d. Pal. Bd. i. 1876–80, p. 514, fig. 373. The ten ribs are shown and part of the perignathic girdle.

The Fifth Basal Plate.—The specimens of *Discoidea cylindrica* in the British Museum show that the fifth basal is not a complementary plate, but a true basal which is not perforated for a genital duct, but which is penetrated by the madreporite. The position and dimensions of the plate are those of a normal basal in other forms; and it is not comparable with the so-called fifth plate described by Cotteau in one specimen of *Echinoconus albogalerus*, for that was a part of the left posterior basal. *Echinoconus* has no fifth basal.

The Evolution of the Fifth Genital Duct and the Perforation of the Fifth Basal Plate of Species of Discoidea.—Lovén has argued that during the lapse of time the generative organs of species of *Discoidea* became more fully developed after the anus moved out of the apex, and that the fifth plate reappeared and became perforated by a genital duct*. There is much to be advanced in favour of this remarkable generalization, and it is certainly the case that the oldest species had four basals perforated by genital ducts, whilst the youngest had five perforated basals. The oldest species do not, however, obtain a fifth genital duct, and its perforation during lapse of ages does not occur; for the oldest and youngest forms of *Discoidea cylindrica*, for instance, have only four perforated basals. *D. conica*, Desor, is a Gault and Albien species of Europe and Africa, and it follows Lovén's law, and has but four basals perforated by the duct, and the fifth is imperforate. *D. subuculus* ranges from the Warminster Upper Greensand into the Lower Chalk; and it has been described as having only four or sometimes five basals perforated; there are two specimens in the British Museum in which all the basals are perforated.

Discoidea minima, *D. Favrina*, *D. Jullieni*, and *D. Forgemolli* are European and North-African forms, and all have five basals perforated; and the age of the fossils is Cenomanien. *D. infera* and *D. Dixoni* are from the Upper Chalk, and all the five basals are perforated.

So far as the whole genus is concerned, the generalization of the appearance of the fifth basal perforation in the later ages of its lifetime is proved; but the appearance of a fifth perforated basal in time has not been proved to occur in the same

* Lovén, On *Pourtalesia*, Kongl. Svenska Vetenskaps-Akademiens Handlingar, Bd. xix. No. 7, 1883, p. 68.

species. The validity of this interesting observation by Lovén will have to be tested on other grounds; for it is a matter of considerable doubt in our minds whether all the species which have been admitted into the genus *Discoidea* can remain in it.

D. subuculus differs much from *D. cylindrica* in the hollowed-out and tumid nature of the actinal part of the test, in the existence of low primary ambulacral plates only, and their great crowding without the formation of compound plates. Again, the madreporite is in the second basal only. Nevertheless, we have found ribs on the inner surface of the actinal part of the test, as in *D. cylindrica*; and probably the perignathic girdle will be found. As yet, we have only detected very indefinite traces of it.

On the Characters of the Genus *Lophopus*, with Description of a new Species from Australia. By Stuart O. Ridley, M.A., F.L.S.

[Read 4th November, 1886.]

(Plate II.)

Probably in few groups of the Animal Kingdom have such unnatural characters been employed for the distinction of genera and species as in the Phylactolæmatous Polyzoa. Few systematic zoologists can, for example, have studied the relations of *Alcyonella* and *Plumatella* without feeling that the current reasons for separating these two divisions are far from satisfactory, consisting, as expressed by Prof. Allman in his well-known 'Monograph of the Freshwater Polyzoa' (Ray Society, 1856), chiefly in the manner of connection between the tubes composing the colony. "Except in the condition of the dermal system, the structure of *Plumatella* differs in no essential point from that of *Alcyonella*. This system, however, in the coalescence of the tubes into a common mass in *Alcyonella*, while they remain totally distinct in *Plumatella*, presents us with a difference which I believe to be of sufficient importance to justify us in placing the two forms in separate generic groups" (*l. c.* p. 92).

Dr. Jullien ("Monographie des Bryozoaires d'eau douce," Bull. Soc. Zool. France, x. p. 90, published in 1885) has given very forcible expression to this feeling of dissatisfaction, and has indeed introduced into the classification modifications of a very